

AMENDMENTS TO THE CLAIMS

- 1 1. (Currently amended) A shaft for the transmission of torsional loads, the shaft
2 comprising:
 - 3 an elongated inner tube member having opposing open ends;
 - 4 at least one end piece located adjacent at least one end of the inner tube
5 member;
 - 6 a composite material covering the inner tube member and at least a portion
7 of the end piece; and
 - 8 wherein the portion of the end piece covered by the composite material
9 defines a convexly curved are of the end piece.
- 1 2. (Original) The shaft of claim 1 wherein the composite material includes elongated
2 fibers, and the fibers are oriented at an angle which satisfies the condition that the angle
3 of twist of the inner tube at failure equals the angle of twist of the composite material at
4 failure.
- 1 3. (Currently amended) The shaft of claim 1 wherein the composite material includes
2 elongated fibers, and substantially all of the fibers are oriented at a single angle which
3 satisfies the conditions that the shaft have a first natural frequency greater than a
4 predetermined maximum rotational operating speed, the shaft have an ultimate a
5 maximum operating torque strength which exceeds a predetermined maximum operating

6 torque, and the angle of twist of the inner tube at failure equals the angle of twist of the
7 composite material at failure.

1 4. (Original) The shaft of claim 1 wherein an end piece is provided at each end of the
2 shaft.

1 5. (Original) The shaft of claim 4 wherein torsional loads are transmitted from the end
2 pieces to the composite material through multiple load paths.

1 6. (Currently amended) The shaft of claim 5 wherein the multiple load paths comprise a
2 direct connection between the end pieces and the composite material, and an indirect a
3 connection from the end pieces to the inner tube and a connection from the inner tube to
4 the composite material.

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1 7. (Original) The shaft of claim 1 wherein the composite material includes elongated
2 fibers which are oriented relative to the curvature of the portion of the end piece covered
3 by the composite material such that, in the area of the portion of the end piece covered by
4 the composite material, shear loads in the composite material are transferred
5 longitudinally along the length of the fibers.

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1 8. (Original) The shaft of claim 7 wherein the portion of the end piece covered with the
2 composite material defines a geodesic isotensoid elliptical shape derived with reference
3 to the angle of the fibers.

1 9. (Original) The shaft of claim 1 wherein the inner tube comprises a mandrel used in
2 forming the composite material on the shaft.

1 10. (Original) The shaft of claim 9 wherein an end piece is provided at each end of the
2 shaft and the inner tube provides alignment between the end pieces during formation of
3 the shaft.

1 11. (Original) The shaft of claim 1 further including a sacrificial layer covering the
2 composite material.

(cont)

1 12. (Currently amended) The shaft of claim 11 wherein the sacrificial layer comprises a
2 ~~thin layer thinner than, relative to~~ the composite material, and includes fibers oriented at
3 approximately 90 degrees relative to the elongated inner tube member.

1 13. (Original) A shaft for the transmission of torsional loads, the shaft comprising:
2 an elongated inner tube member;
3 an end piece located adjacent each end of the inner tube member;

4 a composite material covering the inner tube member and at least a portion
5 of each of the end piece; and
6 wherein the composite material includes elongated fibers and the portions
7 of the end pieces covered with the composite material defines a geodesic isotenoid
8 elliptical shape derived with reference to the angle of the fibers such that, in the area of
9 the portions of the end pieces covered by the composite material, shear loads in the
10 composite material are transferred longitudinally along the length of the fibers.

1 14. (Currently amended) The shaft of claim 13 wherein substantially all of the fibers are
2 oriented at a single angle which satisfies the conditions that the shaft have a first natural
3 frequency greater than a predetermined maximum rotational operating speed, the shaft
4 have ~~an ultimate~~ a maximum operating torque strength which exceeds a predetermined
5 maximum operating torque, and the angle of twist of the inner tube at failure equals the
6 angle of twist of the composite material at failure.

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1 15. (Original) The shaft of claim 13 wherein torsional loads are transmitted from the end
2 pieces to the composite material through multiple load paths.

1 16. (Currently amended) The shaft of claim 25 wherein the multiple load paths comprise
2 a direct connection between the end pieces and the composite material, and ~~an indirect~~ a
3 connection from the end pieces to the inner tube and a connection from the inner tube to
4 the composite material.